AMENDMENTS TO THE CLAIMS

A marked-up version of the claims that will be pending following entry of the present amendments showing the amendments made herein follows. Matter that has been deleted from the claims is indicated by strikethrough and matter that has been added is indicated by underlining.

1. (Cancelled).

2. (Cancelled).

3. (Currently amended). A nucleic acid ligation assay comprising:

contacting a sample suspected of containing one or more target nucleic acid sequences with one or more subsets of free probes and one or more subsets of spectrally-addressable bound probes;

allowing the one or more subsets of free probes and one or more subsets of spectrally-addressable bound probes to hybridize to the one or more target nucleic acid sequences, if present;

ligating the hybridized free probes with the hybridized spectrally-addressable bound probe, wherein a free probe hybridized to a target nucleic acid sequence is ligated with a spectrally-addressable bound probe hybridized to the same target nucleic acid sequence, to provide spectrally-addressable ligated products; and

~~at least one~~ one or both of detecting the presence of the spectrally addressable ligated products or analyzing the nucleic acid sequence of the spectrally-addressable ligated products; and wherein:

the sample is suspected of containing one or more first and one or more second target nucleic acid sequences, the one or more first target nucleic acid sequences have at least a first portion and a second portion and the one or more second target nucleic acid sequences have at least a first portion and a second portion, and wherein the first portion of the one or more first target nucleic acid sequences is distinguishable from the first portion of the one or more second target nucleic acid sequences but the second portion of the one or more first target nucleic acid sequences is substantially identical to the second portion of the one or more second target nucleic acid sequences; and

the sample is contacted with two subsets of spectrally-addressable bound probes and one subset of free probes, wherein the first subset of spectrally-addressable bound probes is specific for the first portion of the one or more first target nucleic acid sequences and the second set of spectrally-addressable bound probes is specific for the first portion of the one or more second target nucleic acid sequences and the free probes have substantially identical nucleotide sequences specific for the second portion of the one or more first and second target nucleic acid sequences.

4. (Cancelled)

5. (Currently amended). A nucleic acid ligation assay comprising:

contacting a sample suspected of containing one or more target nucleic acid sequences with one or more subsets of free probes and one or more subsets of spectrally-addressable bound probes;

allowing the one or more subsets of free probes and one or more subsets of spectrally-addressable bound probes to hybridize to the one or more target nucleic acid sequences, if present;

ligating the hybridized free probes with the hybridized spectrally-addressable bound probe, wherein a free probe hybridized to a target nucleic acid sequence is ligated with a spectrally-addressable bound probe hybridized to the same target nucleic acid sequence, to provide spectrally-addressable ligated products; and

~~at least one~~ one or both of detecting the presence of the spectrally addressable ligated products or analyzing the nucleic acid sequence of the spectrally-addressable ligated products; and wherein:

the sample is suspected of containing one or more first and one or more second target nucleic acid sequences, the one or more first target nucleic acid sequences have at least a first portion and a second portion and the one or more second target nucleic acid sequences have at least a first portion and a second portion, and wherein the first portion of the one or more first target nucleic acid sequences is distinguishable from the first portion of the one or more second target nucleic acid sequences but the second portion of the one or more first target nucleic acid sequences is substantially identical to the second portion of the one or more second target nucleic acid sequences; and

the sample is contacted with two subsets of free probes and one subset of spectrally-addressable bound probes, wherein the first subset of free probes is specific for the first

portion of the one or more first target nucleic acid sequences and the second set of free probes is specific for the first portion of the one or more second target nucleic acid sequences and the one subset of spectrally-addressable bound probes have substantially identical nucleotide sequences specific for the second portion of the one or more first and second target nucleic acid sequences.

6. (Original). An assay according to Claim 5, wherein the assay is performed in a first and a second reaction vessel, a portion of the sample is contacted with the first subset of free probes in the first reaction vessel and a portion of the sample is contacted with the second subset of free probes in the second reaction vessel.

7. (Previously presented). An assay according to Claim 3, further comprising using a thermostable ligase for ligating the probes.

8. (Presently amended). An assay according to Claim 3, wherein a substantially same amount of at least one fluorescent dye is incorporated into each bound probe in ~~a~~ each subset, but wherein each subset of bound probes incorporates a distinctly different amount of fluorescent dye, and one subset of spectrally-addressable bound probes is distinguishable from other subsets of spectrally-addressable bound probes based at least on the relative amount of the at least one fluorescent dye incorporated into the spectrally-addressable bound probe of the subset.

9. (Previously presented). An assay according to Claim 3, wherein the assay further comprises contacting the sample with polymerase chain reaction components and amplifying the target nucleic acid molecule.

10. (Currently amended). A microsphere-based oligonucleotide ligation assay comprising:

(a) contacting a sample, which is suspected of containing target nucleic acid molecules having a certain nucleotide sequence, with a mixture comprising at least one set of free probes and at least one subset of bound probes, wherein

(i) the free probes of a given set comprise two opposing ends, with a detectable label at one of their ends and a nucleotide at the opposite end, and an oligonucleotide having a predetermined nucleotide sequence that is complementary to at least a portion of the target nucleic acid molecules;

(ii) the bound probes comprise a microsphere and an oligonucleotide probe, wherein the ~~bound probes~~ oligonucleotide probes of a given subset of bound probes further comprise an oligonucleotide at one of their ends having a modifier moiety, which is used for coupling ~~a bound probe to a~~ the oligonucleotide probe to the microsphere, ~~at one of their ends~~ and wherein the oligonucleotide probe further comprises an oligonucleotide having a predetermined nucleotide sequence that is complementary to at least another portion of the target nucleic acid molecules; and

(iii) the microspheres of bound probes of a given subset having a unique spectral address or a unique fluorescence intensity, which allows one to distinguish the microspheres of a given subset from those of another;

(b) allowing the free probes and the bound probes to hybridize to the target nucleic acid molecules,

(c) ligating one of the ends of the free probes with one of the ends of the bound probes to provide microsphere-bound ligated products; and

(d) detecting the presence of microsphere-bound ligated products.

11. (Original). The assay of Claim 10 in which the free probes and the bound probes are allowed to hybridize to different portions of the target nucleic acid molecules.

12. (Original). The assay of Claim 11 in which the different portions of the target nucleic acid molecules do not overlap.

13. (Original). The assay of Claim 10 in which the free probes further comprise a phosphate at the other of their ends.

14. (Original). The assay of Claim 10 in which the bound probes further comprise a phosphate at the other of their ends.

15. (Currently amended). The assay of Claim 10 in which the mixture comprises at least two subsets of ~~microspheres~~ bound probes, the ~~bound~~ oligonucleotide probes coupled to the microspheres of one subset being different from those coupled to the microspheres of the at least one other subset.

16. (Currently amended). The assay of Claim 15 in which the bound probes differ in that the nucleotide found at one end of oligonucleotide probes of one subset differs from that found at the corresponding end of the oligonucleotide probes of the other subset, wherein the nucleotide sequences comprising the oligonucleotide probes of the at least two subsets of bound probes are otherwise substantially identical.

17. (Original). The assay of Claim 16 in which the mixture comprises free probes having substantially identical nucleotide sequences.

18. (Original). The assay of Claim 15 in which the bound probes differ in the identity of one or more nucleotides at one or more positions of the predetermined nucleotide sequence.

19. (Original). The assay of Claim 15 in which the bound probes differ due to one or more substitutions, insertions, deletions, or combinations thereof, at one or more positions of the predetermined nucleotide sequence.

20. (Currently amended). The assay of Claim 11 in which the mixture comprises at least two sets of free probes, the nucleotide and the detectable label found at opposite ends of the free probes of one set differing from the nucleotide and the detectable label found in the corresponding ends of the free probes of the other set, wherein the nucleotide sequences comprising the at least two sets of free probes are otherwise substantially identical.

21. (Original). The assay of Claim 20 in which the mixture comprises bound probes having substantially identical nucleotide sequences.

22. (Currently amended). The assay of Claim 10 in which the oligonucleotides of the at least one set of free probes and at least one subset of bound probes have 5' and 3' ends, and wherein the free probes of a given set include a phosphate at their 5' ends and a detectable label at their 3' ends; and the modifier moiety is an amine which couples the 5' end of the oligonucleotide of the bound probe to a carboxylic acid group on the microsphere of the same bound probe.

23. (Currently amended). The assay of Claim 22 in which the mixture comprises at least two subsets of bound probes, the oligonucleotides ~~probes~~ coupled to the microspheres of one subset of bound probes being different from the oligonucleotides ~~probes~~ coupled to the microspheres of the other subset of bound probes in that:

a portion of the 3' end of the oligonucleotides ~~probe~~ of one subset of bound probes differs in nucleotide sequence from a portion of the 3' end of the oligonucleotides ~~probe~~ of the other subset of bound probes; and

wherein the nucleotide sequences comprising the oligonucleotides ~~probes~~ of the at least two subsets of bound probes are otherwise substantially identical.

24. (Original). The assay of Claim 22 in which the mixture comprises at least two sets of free probes, the portion of the oligonucleotide found at the 5' end of one set

differing from the portion of the oligonucleotide at the 5' ends of the other set, wherein the nucleotide sequences comprising the at least two sets of free probes are otherwise substantially identical.

25. (Currently amended). The assay of Claim 22, wherein the assay ~~which~~ is carried out in a single reaction vessel.

26. (Currently amended). The assay of Claim 22, wherein the assay ~~which~~ is carried out in separate reaction vessels, using at least one reaction vessel for each set of free probes.

27. (Previously presented). The assay of Claim 23 in which the microspheres of one subset can be distinguished from the microspheres of the other subset in that the microspheres of the one subset harbor at least one fluorescent dye that emits, upon exposure to an excitatory stimulus, a signal having an intensity that differs from the intensity of a signal emitted by the at least one fluorescent dye harbored by the microspheres of the other subset.

28. (Original). The assay of Claim 23 in which the spectrally addressable microspheres of one subset can be distinguished from the spectrally addressable microspheres of another subset by the relative amounts of at least two fluorescent dyes harbored by the spectrally addressable microspheres.

29. (Original). The assay of Claim 22, wherein the mixture further comprises polymerase chain reaction components, and wherein the assay further comprises the step of amplifying a portion of the target nucleic acid molecule.

30-34. (Cancelled).

35. (Original). The assay of Claim 10 in which the modifier moiety comprises an amine modifier moiety.

36. (Original). The assay of Claim 10 in which the modifier moiety comprises a primary amine group for coupling the bound probe to a carboxylic acid group of the microsphere.